

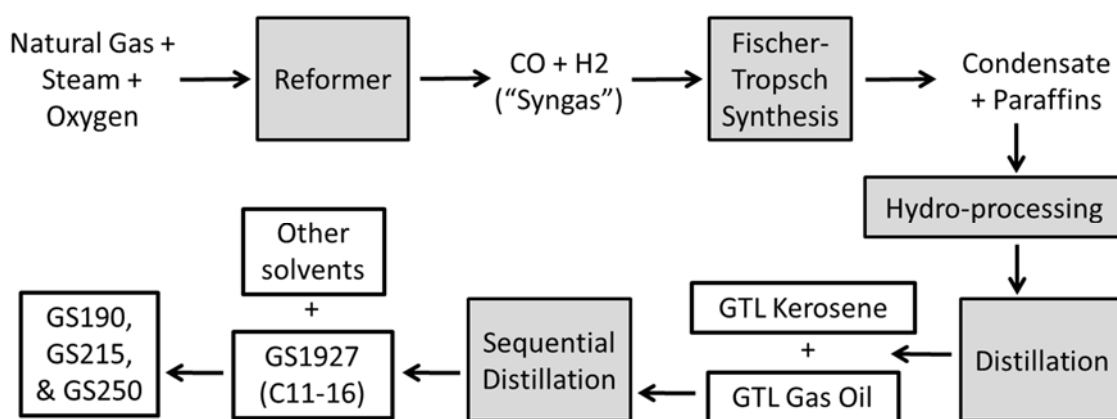
# Shell GTL Solvent GS1927

## Expert Environmental Hazard Assessment

### INTRODUCTION

The gas-to-liquids (GTL) process uses Fischer-Tropsch synthesis to generate hydrocarbon molecules from carbon monoxide derived from natural gas. The resulting complex feedstock consists of branched and linear alkanes ranging from C8-C26. This feedstock, which is called GTL Gasoil (CAS No.: 848301-67-7)<sup>1</sup>, is fractionated into GTL Solvents by distillation. By nature of the synthesis, GTL products have very low aromatic content. The synthesis of GTL Gasoil and its subsequent fractionation into GTL Solvents is shown in Figure 1.

**Figure 1 - Process for synthesis of GTL Kerosene, GTL Gasoil and GTL Solvents**



The GTL Solvents portfolio, including the GTL Gas Oil, is listed in Table 1.

**Table 1: List of GTL products, their chemical names, CAS numbers, and TSCA listing**

Shell GTL Solvent	Chemical name	CAS Number	On TSCA Inventory
GTL Gas Oil	Distillates (Fischer-Tropsch), C8 – C26, branched and linear	848301-67-7	Y
GS160	Alkanes, C8-11-branched and linear	1437281-13-4	Y
GS170	Alkanes, C9-12-branched and linear	1437281-04-3	Y
GS190	Alkanes, C10-13-branched and linear	185857-36-7	Y
GS210	Alkanes, C9-13-branched and linear	1437280-84-6	Y
GS215	Alkanes, C12-15-branched and linear	1437281-03-2	Y
GS250	Alkanes, C14-16-branched and linear	1174918-46-7	Y
GS270	Alkanes, C15-19-branched and linear	1437281-01-0	Y
GS310	Alkanes, C18-24-branched and linear	1437280-85-7	Y
GS1927	Alkanes, C11-16 branched and linear	1809170-78-2	subject of this PMN

<sup>1</sup> Chemical name: Distillates (Fischer-Tropsch), C8 – C26, branched and linear

## HAZARD SUMMARY OF GS1927

This document has been prepared to provide an overview of the environmental hazard profile of Shell GTL Solvent GS1927 and is based on available experimental data for other GTL Solvents. As shown in Figure 1, due to the sequential distillation process, GS1927 is a precursor to solvents GS190, GS215 and GS250, all of which have been listed on TSCA. This provides a strong case for read-across of data from these solvents to GS1927. For clarity, the composition of GS1927 is compared with GS190, GS215, and GS250 in Table 2. This demonstrates that these products span the full carbon range of GS1927, and that the same types of molecules are present in each of these products. The data available for supporting substances are appropriate and sufficient to fully characterise the endpoints for GS1927.

**Table 2: Composition of Shell GTL solvents GS190, GS215, GS250, and GS1927**

	% Linear/% Branched (% anticipated range)			
Carbon #	GTL GS190	GTL GS215	GTL GS250	GTL GS1927
10 or less	3.2/3.0 (5-10)			0.6/0.2 (<10)
11	8.1/19.7 (20-35)	1.1/1.4 (<5)		5.3/4.8 (<15)
12	7.0/39.7 (40-55)	4.0/10.3 (10-25)		4.3/13.2 (10-25)
13	0.7/17.7 (10-25)	7.5/29.1 (30-45)	1.2/1.5 (<5)	7.2/17.9 (10-30)
14	0/0.9 (<5)	4.4/33.8 (30-45)	8.8/15.6 (15-30)	3.6/16.7 (15-30)
15		0.1/8.2 (5-15)	8.9/44.7 (45-60)	3.9/15.2 (10-30)
16		0/0.1 (<5)	0.5/18.5 (10-25)	0/7.1 (2-15)
17 or more			0/0.3 (<5)	0/0 (<5)

## Aquatic toxicity

The bioavailability of the GTL products is limited by their water solubility due to their long carbon chain length and relatively simple branching. While no experimental data is available for the specific PMN substance GS1927, there is data on the related GTL solvents that either compose GS1927 or are close in carbon range. In all studies, no adverse effects were observed at the highest loading rates tested in water-accommodated fractions (WAFs), which was 100 mg/L. The acute toxicity tests showed the LL<sub>50</sub> for fish, EL<sub>50</sub> (daphnia), and ErL50 (algae) were >100 mg/L. There were also no sublethal effects observed in fish, daphnia, and algae chronic toxicity tests with GS170 and GS190, which have shorter carbon chain lengths. Since GS170 and GS190 are lighter, more water-soluble cuts, their toxicity tests are considered to give a conservative result for read-across to GS1927. All testing has been GLP certified.

Based on data for related GTL solvents, it can be concluded that GS1927 is not acutely or chronically toxic to aquatic organisms.

**Table 3: Summary of Aquatic Toxicity Testing Data for Analogues of GS1927 (C11-16)**

Test	Substance (range)	Result	Analytical Method	Reference	File Name
Acute fish (OECD 203)	GS170 (9-12)	96h-LL50 >100 mg/L; NOELR = 100 mg/L WAF	TOC <sup>2</sup>	Tobor-Kaplon, M.A. (2014)	Acute Fish – GS170
	GS215 (12-15)	96h-LL50 >100 mg/L; NOELR = 100 mg/L WAF	TOC <sup>2</sup>	Tobor-Kaplon, M.A. (2014b)	Acute Fish – GS215
Acute invertebrate (OECD 202)	GS190 (10-13)	48h-EL50 >100 mg/L; NOELR = 100 mg/L WAF	TOC <sup>2</sup>	Sacker, D. (2014)	Acute Daphnia – GS190
	GS215 (12-15)	48h-EL50 >100 mg/L; NOELR = 100 mg/L WAF	TOC <sup>2</sup>	Sacker, D. (2014b)	Acute Daphnia – GS215
	GS250 (14-16)	48h-EL50 >100 mg/L; NOELR = 100 mg/L WAF	TOC <sup>2</sup>	Harris, S. (2014)	Acute Daphnia – GS270
Algae (OECD 201)	GS190 (10-13)	72h-EL50 >100 mg/L; NOELR = 100 mg/L WAF	Headspace GC-FID <sup>3</sup>	Vryenhoef, H. (2015)	Algae – GS190
	GS215 (12-15)	72h-EL50 >100 mg/L; NOELR = 100 mg/L WAF	TOC <sup>2</sup>	Vryenhoef, H. (2014)	Algae – GS215
	GS250 (14-16)	72h-EL50 >100 mg/L; NOELR = 100 mg/L WAF	TOC <sup>2</sup>	Vryenhoef, H. (2014b)	Algae – GS250
Chronic invertebrate (OECD 211)	GS170 (9-12)	NOELR ≥ 100 mg/L WAF	Headspace GC-FID <sup>3</sup>	Sacker, D. (2015)	Chronic Daphnia- GS170
Chronic fish (OECD 210)	GS190 (10-13)	NOELR ≥ 100 mg/L WAF	Headspace GC-FID <sup>3</sup>	Sacker, D. (2015b)	Chronic Fish – GS190

<sup>2</sup> Total Organic Carbon of 100 mg/L WAF, corrected for control. Due to the poorly soluble nature of the test substances and the sensitivity of the analytical method, the values obtained in these measurements are not considered quantitative. They give a reflection of the presence of test substance, but not its concentration.

<sup>3</sup> Headspace analysis: From limit of detection to below limit of quantitation. Due to the poorly soluble nature of the test substances and the sensitivity of the analytical method, the values obtained in these measurements are not considered quantitative. They give a reflection of the presence of test substance, but not its concentration.

### Biodegradability

There is convincing evidence to demonstrate that GS1927, like other GTL Solvents, is not persistent, and will degrade rapidly in the environment. The TSCA-registered GTL solvents that compose GS1927, namely GS190 (C10-13), GS215 (12-15), and GS250 (C14-16), all pass the ready biodegradability test with 88%, 71%, and 75% removal after 28 days, respectively (Table 4). It can therefore be inferred that GS1927 is also readily biodegradable.

**Table 4: Summary of Biodegradability Testing Data for Analogues of GS1927 (C11-16)**

Test	Test Substance (carbon range)	Result	Analytical Method	Reference	File Name
Ready biodegradability (OECD 301F)	GS190 (10-13)	88%, readily biodegradable	GC-FID	Vryenhoef, H. (2014c)	Biodegradability – GS190
	GS215 (12-15)	71%, readily biodegradable	GC-FID	Vryenhoef, H. (2014d)	Biodegradability – GS215
	GS250 (14-16)	75%, readily biodegradable	GC-FID	Best, N. (2014)	Biodegradability – GS250

## REFERENCES

- Best, N., (2014) Shell GTL Solvent GS250: Assessment of Ready Biodegradability; Manometric Respirometry Test. Testing laboratory: Harlan Laboratories Ltd. Shardlow Business Park, Shardlow, Derbyshire, DE72 2GD, UK. Report no.: 41402200.
- Harris, S. (2014). Shell GTL Solvent GS250: *Daphnia* sp., 48-Hour Acute Immobilization Test. Testing Laboratory: Harlan Laboratories Ltd. Shardlow Business Park, Shardlow, Derbyshire, DE72 2GD, UK. Report no.: 41402192.
- Sacker, D. (2014), Shell GTL Solvent GS190: *Daphnia* sp., 48-Hour Acute Immobilization Test. Study conducted by Harlan Laboratories Ltd, Shardlow Business Park, Shardlow, Derbyshire, DE72 2GD, Project Number: 41402186.
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- Vryenhoef, H. (2014) Shell GTL Solvent GS215: Algal Growth Inhibition Test. Testing laboratory: Harlan Laboratories Ltd, Shardlow Business Park, Shardlow, Derbyshire, DE72 2GD, UK. Report no.: 41402191.
- Vryenhoef, H. (2014b) Shell GTL Solvent GS250: Algal Growth Inhibition Test. Testing laboratory: Harlan Laboratories Ltd, Shardlow Business Park, Shardlow, Derbyshire, DE72 2GD, UK. Report no.: 41402193.
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Vryenhoef, H. (2014d) Shell GTL Solvent GS215: Assessment of Ready Biodegradability; Manometric Respirometry Test. Testing laboratory: Harlan Laboratories Ltd. Shardlow Business Park, Shardlow, Derbyshire, DE72 2GD, UK. Report no.: 41302231.

Vryenhoef, H. (2015) Shell GTL Solvent GS190: Algal Growth Inhibition Test. Testing laboratory: Harlan Laboratories Ltd, Shardlow Business Park, Shardlow, Derbyshire, DE72 2GD, UK. Report no.: 41402779.